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is everywhere the same, and that it is a typically closed hoop. Their present claim is that the closed hoop structure is unusual. They make the statement that "with some very important exceptions, the girdle is a two-ended band of silica, with the ends variously and characteristically rounded or otherwise modified, and approximated or overlapping without being joined. The position of the gap or joint is, within limits, constant in a given genus with relation to salient features of the valves. In case of each simple pair of primary girdles, the two gaps are usually at opposite points of the diatom; and in general, in the forms we have studied, the gaps are normally so situated with respect to each other as to 'lap joints.'" These claims are supported by the presentation of typical examples.—J. M. C.

NOTES FOR STUDENTS.

THE EFFECT of certain inorganic salts in accelerating the growth of lower plant organisms has recently been made the subject of research by N. Ōno.[11] He has worked with the following substances in very dilute solutions: $ZnSO_4$, $FeSO_4$, $NiSO_4$, $CoSO_4$, $CuSO_4$, $HgCl_2$, $LiNO_3$, NaF, and K_2AsO_3. For fungi *Aspergillus niger* and *Penicillium glaucum* served as subjects; for algæ (and this is the first time this group has been brought under experimentation in this regard), *Protococcus* sp., *Chroococcum* sp., *Hormidium nitens*, and *Stigeoclonium* sp. Suitable nutrient fluids were used unmodified for the control cultures, and with addition of one of the above-named salts for the tests.

With the exception of $CuSO_4$ and $HgCl_2$, all of the salts, in very dilute solution, act upon the algæ to accelerate vegetative growth and to retard the process of zoospore production. All of the salts act in this way upon the fungi studied; in this the author is in accord with Richards.[12] For the algæ the optimum growth is obtained by addition of a much smaller amount of the unusual salt than for the fungi. In the former case the concentration of this compound varies from $\frac{1}{2,500,000}$ to $\frac{1}{100,000}$ gram molecule per liter; in the latter from $\frac{1}{4000}$ to $\frac{1}{800}$ gram molecules per liter. Sixteen pages of tables give the results very clearly. The author has been content to determine the facts as stated above, without inquiring more deeply into their nature. He seems to make the mistake of considering his salts as remaining intact in these dilute solutions, instead of being completely dissociated, as they almost certainly are. It is very probable that (excepting in case of the last two salts in our list) the accelerating stimulus is due to the cations, and if this be true it could easily have been demonstrated by the use of equimolecular solutions of different salts of the same metal. That the effect is not due to the anions we must conclude from the fact that the control solutions contains SO_4-ions from $MgSO_4$, and NO_3-ions from NH_4NO_3 and KNO_3. It may be profitable to call attention to the fact that where NaF and K_2AsO_3 are used the stimulus to growth must be due not to the cations but to the anions. However, the material at hand is far too meager for any general conclusions along this line.

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[11] Ueber die Wachstumsbeschleunigung einiger Algen und Pilze durch chemische Reize. Jour. Coll. Sci. Imp. Univ. Tōkyō. **13**: 141–186. *pl. 13*. 1900.

[12] Die Beeinflussung des Wachsthums einiger Pilze durch chemische Reize. Pringsh. Jahrb. f. wiss. Bot. **30**: 665. 1897.

If our author has seemed somewhat easily satisfied as to the chemical nature of the stimulus with which he is dealing, the omission is palliated by a decided advance which he has made in another line. Heretofore experiments upon acceleration and retardation of growth have gone no further than to determine the relative increase in somatic material. Now, since of the materials taken into the plant body some are used to increase its mass and others go out again more or less completely oxidized, thus contributing energy rather than matter to the organism, it becomes essential to determine whether or not accelerated growth means also a relative increase in the amount of waste products. Of course in the algæ these products of katabolism take the form mainly of CO_2, and, owing to the photosynthetic process, its amount cannot be easily determined. But in fungi we have no such disturbing factor. Much of the waste from these fungi comes off in the partially oxidized form of oxalic acid. The relative amounts of this excreted in the different cases was determined by titration and compared with the amount of sugar taken from the fluid by the growing plants. Relatively much more acid was given off in the normal cultures than in those containing $ZnSO_4$, $CuSO_4$, $CoSO_4$, $HgCl_2$, and NaF. For example, with $ZnSO_4$, in twenty-five days *Aspergillus niger* gave off per gram of its own weight 0.443^{gm} of acid. Without $ZnSO_4$ the amount given off was 2.245^{gm} per gram of its own weight. $NiSO_4$ was the only exception; it acted in the opposite way. What are called "economic coefficients" are obtained by dividing the amount of sugar used by the amount of substance produced in the plant body. This coefficient is much greater in the control cultures than in the others. They average about as one to two. If the weight of the fungus and that of the sugar absorbed could have been reduced to calories, and then this coefficient found as above, it will be seen that it would have been the reciprocal of what, in mechanics, would be termed the efficiency. Thus the result above enunciated seems to show at least that the efficiency of the fungus, as a machine for storing up material, increases with the addition of traces of these poisons. This seems to open up a new method for obtaining some quantitative measurements of the metabolic process. But since the author did not have it in mind his data are not complete enough for this purpose.

One other point is made in the paper. Loew has shown[13] that the spore-producing function of fungi is much more susceptible to the action of poisons than is the vegetative. Thus it should be possible to obtain a concentration of the poison such that it would hinder or stop spore production and still not effect, or effect in a minimum degree, the vegetative growth. But under these conditions the energy normally directed to spore production would probably be turned towards growth. Thus we would have an acceleration in growth due to the retardation in reproduction. This, the author concludes, is probably the case in his researches.— BURTON EDWARD LIVINGSTON.

ITEMS OF TAXONOMIC INTEREST are as follows: W. N. SUKSDORF (Bot. Monatsschrift **18**: 97–99, 132–134. 1900), in continuing his descriptions of Washington plants, has published new varieties in *Viburnum*, *Valerianella*, *Madia*, *Artemisia*, *Troximon*, *Dodecatheon*, *Phlox*, and *Gilia* (3), and new species of *Dodecatheon*, *Gilia*, and *Amsinckia* (4).—In continuing his studies on the fungus flora of South America, DR. H. REHM (Hedwigia **39**: 209–224. 1900) has reached the Discomycetes, in which he describes *Physmatomyces* (Bulgariaceæ) and *Psorotheciopsis* (Mollisieæ) as new genera.— PASCAL CONTI (Mém. Herb. Boiss. no. **18**: 1–86. 1900) has published a revision of the species of *Matthiola*, recognizing 32 species, 5 of which are described as new.— MARCUS E. JONES (Zoe **5**: 41–53. 1900) has published the ninth of his "Contributions to Western Botany," which contains many critical notes, some new forms of *Astragalus*, and a very interesting ecological sketch of the Great Salt Lake desert.—WILLIAM F. WRIGHT (*ibid.* 53–58) has published seven new species and two new varieties of *Galium*, chiefly from California. — E. J. DURAND (Bull. Torr. Bot. Club **27**: 463–495. *pls. 27–32.* 1900) has published a classification of the fleshy Pezizineæ, segregating them into four families on the basis of the structure of the sterile layers of the cup.— E. J. HILL (*ibid.* 496–505) has published an interesting account of *Celtis pumila* Pursh, which he shows should be restored to specific rank.—GEORGE E. OSTERHOUT (*ibid.* 506–508) has described six new forms from Colorado, under *Allium* (2), *Artemisia* (3), and *Agoseris* (1).— AVEN NELSON (from tenth annual report of the Wyoming Exper. Sta.) has published under the title "The Cryptogams of Wyoming" a list of those species which have been secured in the botanical survey of the state.— E. KOEHNE (Engler's Bot. Jahrb. **29**: 161–168. 1900) has completed his account of new Lythraceæ.— L. DIELS (*ibid.* 169–320. *pls. 2–5*) has begun the publication of the flora of Central China, a general consideration of the nature of the region covered being followed by a list of species, including new ones, from Filicales to Caryophyllaceæ inclusive. The paper contains descriptions of 9 new Ferns, 26 new Monocotyledons, and 13 new Dicotyledons so far as the group is considered. *Smilax* contains 10 new species, and a conspectus of *Fagus* is given, 7 species being recognized, one of which is new.— KARL FRITSCH (*ibid.* Beiblatt 5–23) has published an account of the Gesneriaceæ of Brazil. —OTTO V. SEEMAN (*ibid.* Beiblatt 28) has published two new species of *Salix* (*S. pseudolapponum* and *S. aemulans*) from Colorado, collected and distributed by Baker, Earle, and Tracy. —F. V. COVILLE (Proceedings of the Washington Academy of Science **2** : 275–286. *pl. 15.* 1900) has given an account of the tree willows of Alaska, recognizing five species, one of which (*S. amplifolia*) is described as new.—A. W. EVANS (*ibid.* 287–314. *pls. 16–18*) has published notes on the Hepaticae collected in Alaska by the Harriman Expedition, the list containing sixty-three species.—C. L. POLLARD (Proc. Biol. Soc. Washington **13** : 169. 1900) has described a new violet from Alabama.— E. L. MORRIS (*ibid.* 171–182) has discovered in West Virginia forty-seven species heretofore unreported from the state, and also new subspecies of *Polypodium vulgare* and *Vernonia gigantea.*— JOHN M. HOLZINGER (Asa Gray Bull. **8** : 95–99. *pl. 6.* 1900) has reported from Yellowstone National Park a Polytrichum (*P. Jensenii* Hagen) new to the United States, and heretofore known from northern Europe.— K. M. WIEGAND (Bull. Torr. Bot. Club **27** : 511–527. 1900) has published upon *Juncus tenuis* and some of its North American allies, discussing thirteen species, and describing four species as new. — P. A. RYDBERG (*ibid.* 528–538), in continuing his "Studies on the Rocky mountain flora," presents the species of Melanthaceæ, finding that the family is represented in the region under consideration by at least five genera and seventeen species. Of these, one genus (*Stenanthella*) and seven species are described as new. The new genus is based on *Stenanthium occidentale* Gray, and the new species belong to *Tofieldia* (1), *Veratrum* (1), and *Zygadenus* (5).—W. N. SUKSDORF (Bot. Monats. **18** : 153–156. 1900), in continuing his account of Washington plants, has described new species or vareties of *Pentstemon, Mimulus, Castilleia, Aphyllon,* and *Listera.*— In Mém. Herb. Boiss. (no. 20, October 1900) publication of the African flora is continued, new species being described under numerous families by the various collaborators, and under Scrophulariaceæ STAPF describes and figures a new genus under the name *Dintera.*— J. M. C.

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[13] Ein natürliches System von Giftwirkung. 1893.

ARNOLDI'S[14] third contribution to the morphology of gymnosperms deals with the embryology of *Cephalotaxus Fortunei.* Systematists have placed Cephalotaxus between Phyllocladus and Ginkgo on the one side and Torreya and Taxus on the other. In anatomical features it closely resembles Taxus, while the structure of its ovule allies it more nearly with Ginkgo and the cycads. It was the object of this study to determine whether embryology would throw any light upon the relationships of this interesting form. The material was obtained from a botanical garden in southern Russia. Alcohol was used for fixing, and Zimmermann's fuchsin and iodine green method for staining.

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[14] ARNOLDI, W.: Beiträge zur Morphologie der Gymnospermen, III. Embryogenie von *Cephalotaxus Fortunei.* Flora **82**: 46–63. *pls. 1–3.* 1900.

As in many other gymnosperms, the ovules require two years for ripening. In the first year the nucellus and integument are formed and pollination takes place. In the spring of the second year the archesporium and embryo-sac are formed; endosperm appears in May, and before the end of the month the archegonia are developed; fertilization occurs about the middle of June, and during August the embryo is fully formed.

The principal results of the study are as follows:

1. The neck of the archegonium consists of two cells.

2. The material for the growth of the egg is supplied by the nuclei of the cells immediately surrounding it, and has at first the form of very small droplets; after these have passed into the egg they attain considerable size and some complexity of structure; and serve as nourishment for the embryo in its earliest stages.

3. The nucleus of the central cell divides, but does not form a ventral canal cell. The upper part of the central cell with its nucleus then becomes mucilaginous, destroys the neck cells, and presses out from the egg.

4. The pollen tube contains four nuclei, the two male cells being of the same size.

5. After the pollen tube has discharged its contents, one of the male nuclei fuses with the egg nucleus, while the other remains in the upper part of the egg where it may divide amitotically. The fusion nucleus moves to the middle of the egg and divides three or four times. The daughter nuclei divide at the bottom of the archegonium and thus there arises a number of free cells. These cells then become arranged into tiers in much the same manner as in Taxus, according to Jaeger's recent description. The later stages in the development were described long ago by Strasburger.—C. J. CHAMBERLAIN.

THE LIFE HISTORY of a new and interesting member of the Chytridiales has been described by Gobi.[15] This form, *Rhizidiomyces ichneumon*, is found on one of the Volvocaceæ, *Chloromonas globulosa*, and may multiply so rapidly as to create an epidemic among these unicellular organisms. The swarm spores of the fungus settle down on the surface of the Chloromonas, both the motile and resting cells, and there put forth a process which enters the host. While most of the protoplasm of the parasite remains outside of the algal cell, a connection becomes established with the host by the enlargement of the entering process into a sort of bulb on the inside, and the development from this of several filamentous outgrowths. These latter push into the Chloromonas cell, which eventually dies. The amount of protoplasm in the Rhizidiomyces increases rapidly, until the portion outside of the algal cell is almost as large as the host itself. This part then prepares to develop and discharge the swarm spores. The protoplasm is gathered from the interior, and a neck is formed through which the divided contents escape into the water as small uniciliate zoospores that swim slowly away.—B. M. DAVIS.

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[15] Ueber einen neuen parasitischen Pilz, *Rhizidiomyces ichneumon*, nov. sp., und seinen Nährorganismus, *Chloromonas globulosa* (Perty). Scriptis Botanicis Horti Univ. Imp. Petropolitanae **15**: 251–292. *pls. 6–7.* 1899.

GOBI[16] has investigated the life history of a new species of Pythium that lives in the dead and dying filaments of Vaucheria. *Pythium tenue* is a very delicate form whose hyphae can hardly be more than 1–3μ in diameter. It grows in the interior of the Vaucheria filaments, sending an occasional free end of the mycelium through the wall of the alga to the exterior. The end of such a hypha becomes swollen, but is not cut off by a cross wall as is usually the case when sporangia are formed. However, the protoplasm in its interior develops several swarm spores which shortly escape. The swarm spores quickly germinate, coming to rest in the exterior of the Vaucheria filament, where each puts forth a germ tube that pierces the cell wall and within three hours may develop a long hypha. The sexual organs are small and chiefly interesting from the fact that the end of the antheridial filament is not cut off as a distinct cell. The oospore is 8–9μ in diameter and possesses a smooth wall. Nothing is known of its cytoplasmic structure, and its germination has not been observed.—B. M. DAVIS.

MR. O. F. COOK has published in *Science* (**12**: 475–481. 1900) his very interesting paper on "The method of types in botanical nomenclature." After a well organized discussion of the subject, the following general statements are advanced. "In biology a species is a coherent or continuous group of organisms." "For nomenclatorial purposes a species is a group of individuals which has been designated by a scientific (preferably a Latin adjective) name, the first individual to which the name was applied constituting the type of the species." "For purposes of reference and citation specific names which appeared previous to the *Species Plantarum* of Linnaeus are not regarded in botanical nomenclature." "A genus of organisms is a species without close affinities, or a group of mutually related species." "A generic name is established in taxonomy when it has been applied to a recognizable species." "The generic taxonomy of plants may be treated as beginning with Tournefort's *Institutiones* (1700)."—J. M. C.

MR. L. A. BOODLE has begun the publication of a series of papers on the comparative anatomy of the Hymenophyllaceae, Schizaeaceae, and Gleicheniaceae, the first[17] dealing with the Hymenophylleaceæ. A summary of his results is as follows: the stem is monostelic, and one leaf trace passes to each leaf; the stele contains no pith, and is of several types, (1) a xylem mass with internal protoxylem, connected with leaf traces, (2) a xylem mass with indefinite scattered protoxylem, (3) a xylem mass with peripheral protoxylem, (4) sub-collateral, (5) a collateral bundle. The author thinks that the sub-collateral structure has probably been derived from a more complicated type by reduction, and that the filmy habit of Hymenophyllum is probably not primitive.—J. M. C.

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[16] GOBI: Entwickelungsgeschichte des *Pythium tenue*, nov. sp. Scriptis Bot. Horti Univ. Imp. Petropol. **15**: 211. *pls. 4–5.* 1899.

[17] Annals of Botany **14**: 455–496. *pls. 25–27.* 1900.

MR. R. F. SHOVE has published[18] an account of the structure of the stem of *Angiopteris evecta*, which in 1864 had been described in detail by Mettenius, but from whom the present author differs in several particulars. The position of the protophloem in the stem stele is said to be anomalous, occurring on the outer side of the stele in the form of a discontinuous arc. The centrifugal growth of the phloem is also said to be contrary to that described for most other ferns, but the other Marattiaceæ are not included in this comparison. The mesarch and endarch structure of the steles was confirmed, and also the presence of several initials at the apex of the stem. —J. M. C.

W. L. BRAY discusses the relations of the North American flora to that of South America.[19] Few new conclusions are reached, but there is an interesting summary of the known data on the subject. The most important agencies which have brought about relationships are those which have acted in the past; the endemic northern floras of Mexico and the Andes are to be referred to such causes. Minor agencies of distribution are still active, especially those along the gulf zone and those due to man.—H. C. COWLES.

ULE DESCRIBES several isolated observations[20] that he has made concerning the influence of animals upon plants in the tropics. These observations have to do mainly with pollination and seed dispersal. He opposes the view that palms and other plants which develop a considerable amount of heat in the flowers do so with any relation to pollination. This theory is *a priori* improbable, and the author adds that no protection would be necessary to the insects in tropical climates, and furthermore that the insects do not fly at night.—H. C. COWLES.

MISS ETHEL N. THOMAS has announced[21] the discovery of double fertilization in *Caltha palustris*. The original discoveries of this phenomenon, it will be remembered, were among the Liliaceæ, so that the discovery of

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[18] Annals of Botany **14**: 497–525. *pls. 28–29.* 1900.

[19] Science **12**: 709–716. 1900.

[20] Ber. deutsch. Bot. Ges. **18**: 122–130. 1900.

[21] Annals of Botany **14**: 527–535. *pl. 30.* 1900.

Miss Thomas was interesting in extending the phenomenon to the dicotyledons. Before the publication of her paper, however, Nawaschin had announced his discovery of double fertilization in Helianthus and Rudbeckia, and its probable occurrence in Delphinium; while more recently Land[22] has included Erigeron and Silphium.—J. M. C.

W. H. LONG, JR.,[23] gives an interesting preliminary account of the ecological distribution of fungi in the vicinity of Austin, Texas. In general the conditions do not seem to favor a great abundance of fungi, the numbers being limited by the nature of the soil, the paucity of forests, and the climate. Parasitic forms are limited by reason of the xerophytic nature of the host leaves. The saprophytic forms are ecologically subdivided into dung inhabiting species, cedar brake fungi, post oak land species, species of grassy places, epixylous species, and species of open rocky soil.—H. C. COWLES.

MR. JAMES BRITTEN has done good service to taxonomists in publishing in the *Journal of Botany* (**38**: 430–443. 1900) a textual reproduction of the two pages of Linnaeus's *Systema Naturae*, ed. i, which give in tabular form the classification of plants. The occasion for this is the great rarity of the work, which is a folio, whose preface is dated from Leyden, July 23, 1735.—J. M. C.

DR. HERMANN VON SCHRENK has published an account[24] of two diseases of red cedar, one called "white rot," and caused by *Polyporus juniperinus*, described as a new species; the other called "red rot" or "pecky cedar," and caused by *Polyporus carneus*. Seven plates, mostly from photographs of diseased wood, accompany the paper.—J. M. C.

THE CALYX HYDATHODES which have been found by Koorders are confined to tropical plants. Shibata[25] adds five Japan species, and finds that the hydathodes secrete mainly water, but that they also secrete some sugar and thus have a relationship to nectaries.—H. C. COWLES.

[22] Botanical Gazette **30**: 252–260. 1900.

[23] Bull. Torr. Bot. Club **27**: 579–588. 1900.

[24] Bulletin 21, U. S. Dept. of Agric. Div. of Veg. Phys. and Path. 1900.

[25] Bot. Centralbl. **83**: 350. 1900.